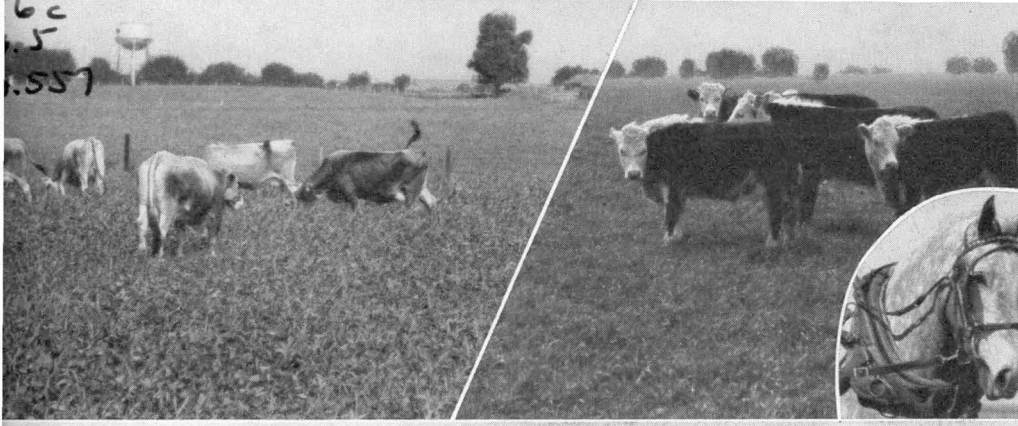


CIRCULAR 557
UNIVERSITY OF ILLINOIS
COLLEGE OF AGRICULTURE
EXTENSION SERVICE IN
AGRICULTURE AND
HOME ECONOMICS

FIGHT ANIMAL DISEASE!

TO MEET PRODUCTION GOALS

CONTENTS

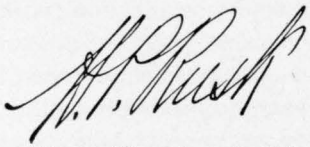
Urbana, Illinois May, 1943

Cooperative Extension Work in Agriculture and Home Economics: University of Illinois, College of Agriculture, and the United States Department of Agriculture cooperating. H. P. Rusk, *Director*. Acts approved by Congress May 8 and June 30, 1914.

THIS CIRCULAR HAS BEEN PREPARED TO AID FARMERS AND stockmen in preventing animal disease losses. Such losses are costly even in normal times. In times like the present, when herds and flocks are being increased to meet war needs, disease problems loom larger than ever, for they are complicated by farm labor shortages, overcrowding of barns and feedlots, and reduced veterinary service. The information in this circular will, it is hoped, be of help in this situation, but nothing in it should be construed as encouragement to farmers or farm advisers to assume the professional responsibilities of a trained veterinarian.

Most livestock diseases can be prevented by good management: right feeding, proper shelter, cleanliness of stables, pastures, houses, and general equipment. Farm advisers in every county in the state are rendering invaluable aid to farmers by helping them combat disease losses in this way. When, however, a disease appears that a farmer himself cannot cope with by applying simple hygienic measures, then veterinary services are needed. Prompt diagnosis and neighborhood cooperation in the application of appropriate control measures will go a long way toward keeping losses to the minimum. With the increasing value of food-producing animals, fewer farmers are willing to attempt to treat their own stock.

The state of Illinois has provided veterinarians and farmers with special aid in disease control thru service rendered by the office of the State Veterinarian, Springfield, and the maintenance in the Department of Animal Pathology and Hygiene, University of Illinois, Urbana, of a diagnostic laboratory administered in cooperation with the State Department of Agriculture. This laboratory gives assistance without charge to veterinarians, farmers, and stockmen in the diagnosis of animal diseases. Live typically affected animals should be delivered for examination whenever possible.



Director, Illinois Agricultural Experiment Station and Extension Service in Agriculture and Home Economics

Authors of this publication include the following members of the DEPARTMENT OF ANIMAL PATHOLOGY AND HYGIENE, University of Illinois: Robert Graham, Jesse Sampson, C. C. Morrill, E. H. Peterson, and W. M. Thorning (*resigned*).

NUTRITIONAL DISEASES

Since faulty nutrition is one of the important causes of unthriftiness and losses in farm animals, livestock owners will save themselves much grief by becoming thoroly "nutrition conscious."

Too little protein and minerals. Farm animals are subject to a number of nutritional deficiencies which cut down production, cause unthriftiness, and may even reduce an animal's resistance to infections. Actual starvation may result from too small a ration, or the absence of enough of certain mineral elements and vitamins in the feeds, or from the low quality of the protein.

The **amount** of protein needed in a ration varies with the kind of animal, its sex, and its functioning. Young growing animals, pregnant and lactating females, and laying hens require a higher percentage than others. In poultry feeding and in swine feeding the **kind** of protein is especially important. For best results with these animals, proteins from several sources should be fed, and at least part of these protein feeds should be of animal origin, such as skimmilk, whey, buttermilk, tankage, meat scrap, or fish meal.

Of the mineral elements which are essential for animal life, most are supplied in abundance in ordinary rations fed in Illinois. All animals should be given common salt in addition. Swine and poultry require more calcium than is present in farm grains, which constitute such a large proportion of their rations; and under some conditions they may require additional phosphorus. Iron in some form should be given to nursing pigs which are kept in floored pens (*see page 22*); and in so-called "goiterous regions" small amounts of iodine (as in iodized salt) should be added to the rations of pregnant females. Lactating, growing, and pregnant animals and laying hens require much more calcium and phosphorus than do other animals. All of these needs, however, can be simply met.

The following mineral mixtures have given satisfaction: ground limestone 3 parts, salt 1 part; or steamed bonemeal 2 parts, ground limestone 2 parts, salt 1 part. These mixtures may be self-fed to pigs or added to the grain ration of cattle to the extent of 1 or 2 percent. Ordinary rock phosphate and acid phosphate should not be used because they contain dangerous amounts of the poisonous element fluorine. Dicalcium phosphate and defluorinated rock phosphate are satisfactory sources of phosphorus.

To reduce expense, livestock owners are encouraged to mix their own minerals; but the real need for more minerals should be ascer-

tained before they are fed. If there is enough of a mineral in the ration, feeding more of it will do no good. Money can be saved, for example, by feeding the first mixture mentioned above, which is less expensive than the second, if only calcium is needed. *For further information see References 1 and 13, pages 46 and 47.*

Vitamin deficiencies. Vitamins A and D are the ones most likely to be lacking in livestock rations in Illinois. Too little of vitamin D will cause rickets in young animals—calves, foals, pigs, lambs, kids, pups, and chicks. Rickets may also be caused by too little calcium or phosphorus or by conditions interfering with their proper utilization, some of which are not well understood.

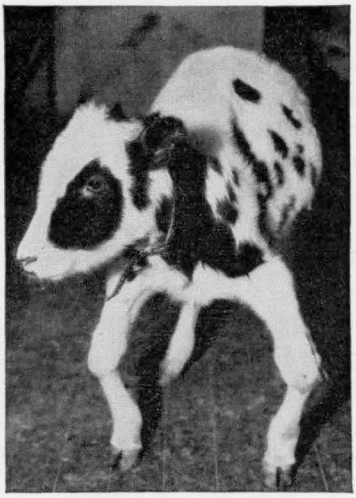
Animals suffering from rickets should be given steamed bonemeal. In order to supply vitamin D, they should be fed sun-cured roughage, such as alfalfa hay, and allowed as much exposure to the sun as possible. Pigs may be fed rations containing 5 to 10 percent of alfalfa meal. These same measures will help to prevent rickets in animals that are kept housed. Calves, growing chicks, and laying hens may require, besides minerals, vitamin-D supplements. Either irradiated yeast or cod-liver oil is satisfactory for calves. Poultry should be given cod-liver oil or other fish oils during the winter months. During the war, substitutes may have to be used in place of these more common sources of vitamins A and D.

Night blindness and certain reproductive failures in cattle are symptoms of vitamin-A deficiency. Total blindness may develop. Another symptom is the swelling of the legs. There may be partial or complete interference with reproduction. Males are rendered infertile, while females either fail to conceive or abort their young. Calves carried full term may be dead upon arrival or may die soon after birth. Swine also show night blindness and reproductive failure. Pigs may be born with deformities, such as cleft lips and imperfect development of the mouth.

All green forages and leafy, properly cured, bright green hay are good sources of vitamin A. New yellow corn is a good source, but the vitamin-A content decreases rapidly during storage. Vitamin-A deficiency may occur when cattle are wintered on poor-quality hay or fattened on old corn, cereal grains, or beet by-products with limited amounts of poor hay.

Calves are born with a low vitamin-A reserve. For this reason they should obtain the colostrum, or first milk, which is relatively rich in this vitamin. Skimmilk contains very little vitamin A, for this substance is removed in the cream. In fact, whole milk contains much less during late winter and early spring than in the summer and fall. Calves

fed skimmilk should be given some vitamin-A supplement, such as cod-liver oil, and green forage—clover, or mixed clover and timothy, or alfalfa—just as soon as they are able to eat and digest it.



A severe case of rickets

Nutritional roup in poultry is due to vitamin-A deficiency. In young birds the disease may be fatal at about the third or fourth week of life. Older birds become unthrifty and develop swellings about the eyes or have difficulty in breathing. Egg production and hatchability decline. More often, however, the flock suffers from a mild form of vitamin-A deficiency in which there are no deaths, but the growth and thriftiness of the birds are impaired. For this reason it is important that chickens have an ample supply of vitamin A. Green forage is an excellent source of this vitamin for poultry. Confined birds should receive some special supplement such as fish oils, alfalfa meal, or carrots. The requirements of both vitamins A and D should be considered jointly when supplying vitamin supplements.

Curled-toe paralysis in young chicks is due to a deficiency of riboflavin, one fraction of the vitamin-B complex. Milk and alfalfa meal are good sources of riboflavin. The feeding of milk readily corrects the condition.

It is much cheaper to prevent disease than to try to cure sick animals. The best health insurance is to follow these 7 rules of good management:

Stock with healthy, vigorous breeding animals
Feed balanced rations
Provide adequate shelter and do not overcrowd
Rotate pastures and lots
Clean and disinfect buildings frequently
Immunize against certain communicable diseases
Isolate diseased animals

When disease becomes a problem, consult a veterinarian for diagnosis and treatment.

CATTLE . . .

Abortion, infectious (brucellosis, or Bang's disease) is the cause of about 85 percent of the abortions in cattle. It may cause premature birth of the calf, as well as sterility, lowered milk production, and udder trouble in the cow. Susceptible animals contract the disease from contaminated food or water or directly from new-born calves, fetuses or discharges of infected animals.

Aborted calf from cow infected with brucellosis

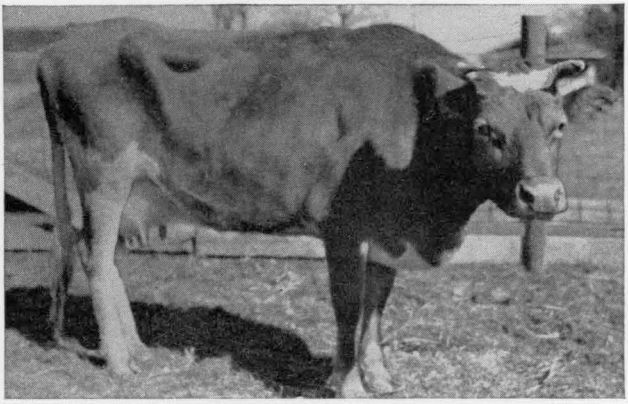
Blood testing is a reliable method of detecting infected animals. In herds having only a small number of infected animals, it is often advisable to sell the reactors for slaughter; in herds with a large number of reactors, calfhood vaccination and retention of infected high-producing cows may be more profitable. Each herd represents a separate problem, and the advantages and disadvantages of each method of control should be carefully weighed.

Calfhood vaccination employed in keeping with the state regulations has a place in Bang's disease control, but misuse of the vaccine may lead to disappointment and even to disaster.

Drinking of unpasteurized milk or contact with discharges from infected cows may expose human beings to this disease, which in man is known as undulant fever.

The State Department of Agriculture, in cooperation with the Federal Bureau of Animal Industry, has *three plans of brucellosis control.* For information regarding these plans, write CHIEF VETERINARIAN, STATE DEPARTMENT OF AGRICULTURE, *Springfield,* or consult the local veterinarian or farm adviser. *For further information see References 2, 3, and 4, page 46.*

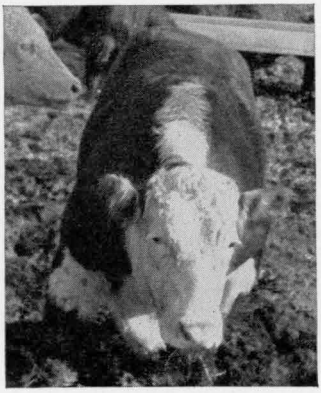
Acetonemia (ketosis) usually occurs shortly before or during the first six to eight weeks after calving. Chief symptoms are lowered milk production, lack of appetite, nervous manifestations ranging from



Loss of weight caused by acetonemia

sluggishness to excitability, and rapid loss of condition. Some cows are more likely to be affected than others, and it is well to feed the usual ration **plus an additional 2 to 5 pounds of corn sugar or molasses daily** as a preventive measure **during the first few weeks of lactation.** The treatment of cows suffering from acetonemia should be given under the direction of a veterinarian.

Big leg (anasarca, or edema) develops either in the front or hind legs and may extend to the shoulder, neck, and rump. The cause of increasing cases of this disease in drylot-fed cattle is not known. There is evidence that the disease may be related in some way to the quality of the ration, possibly to too little vitamin A, for it has been noted in animals fed several months in drylot on rations that contain only a limited amount of roughage and a large amount of old yellow corn. The vitamin-A content of corn diminishes quite rapidly during storage.



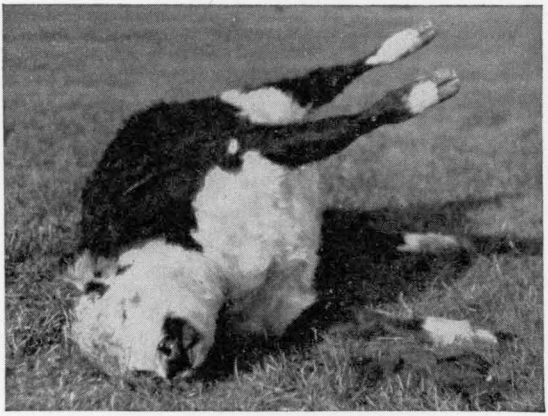
Steer with "big leg"

Animals affected with "big leg" lose weight rapidly, eat indifferently, and move about slowly. Occasionally saliva drools from the mouth. The swelling is a result of an edema, or dropsy, of the affected portion. In the early stages of the disease improvement usually follows

prompt and appropriate changes in the ration. Mild cases respond in three or four days when the animals are turned on pasture and fed new corn. Favorable results have been reported following the feeding of cod-liver oil or leafy alfalfa or other roughage.

Farmers are warned not to market animals that show pronounced swellings of the legs—the death loss is small, but loss of weight and condemnation of such animals at market centers lower their selling price.

Blackleg, contrary to popular opinion, is a year-round disease, altho the majority of cases occur in summer and fall. Blackleg may cause sudden deaths in animals under two years old, especially while on



Death caused by blackleg
(Courtesy of Montana State College)

pasture, whereas older animals are quite resistant. An early symptom is lameness. Swellings which give a crackling sensation when pressed with the fingers frequently occur in the heavily muscled portions. Death usually occurs within 48 hours after the first symptoms are noted.

Preventive vaccination is recommended on contaminated premises. An animal vaccinated at six months of age is usually protected for life.

Bloat in cattle is often responsible for heavy losses. If cattle are turned onto damp, succulent clover or alfalfa, or are allowed to eat unaccustomed large quantities of green legume roughage, the feed may ferment in the rumen, or paunch, and produce so much gas that the animal cannot relieve itself by belching. Bloat may also occur in some animals on dry feed. Death may come within a short time after symptoms develop if the bloat is not relieved.

Some stockmen believe that bloat can be prevented by allowing cattle to remain continuously on clover or alfalfa pasture both night and day. This practice is not entirely safe. Other cattlemen do not

allow the herd to pasture on green rank clover or alfalfa early in the morning when there is a heavy dew or after a rain. Most stockmen allow the cattle a full feed of hay before they are turned on pasture. Pasturing animals on a grass or Sudan pasture in the morning and on legume pasture in the afternoon has proved helpful in reducing the amount of bloat. There should be plenty of water, salt, and dry feed such as hay or straw before the cattle at all times.

Many treatments have been recommended for bloat. A mouth gag or bridle made from a section of a pitchfork or shovel handle, the ends of which are kept in place by a small rope run over the poll, will encourage belching. A tablespoonful of formalin in a quart of water given as a drench will help to check formation of gas in the paunch. An ounce of kerosene in a quart of water may also be used as a drench. This dose may be repeated in one to three hours. Care must be taken not to pour the material into the lungs. If there is time, a veterinarian should be called.

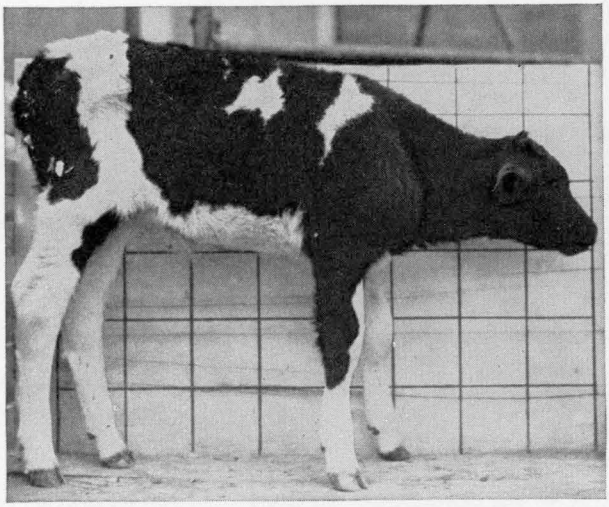
Puncturing the paunch with a trocar or knife should be done only when absolutely necessary. In such an emergency the trocar or knife should be inserted at a point an equal distance from the last rib, the point of the hip, and the edge of the loin, directing it downward and forward. If a knife is used, the paunch, peritoneum, muscles, and skin will have to be stitched by the veterinarian, and the aftercare of the wound should be carried out under his direction.

Calf scours and pneumonia can usually be prevented by careful management and feeding. If the herd is free from brucellosis and other infectious diseases, calving on pasture during the summer is advised. In the winter clean, dry, well-bedded box stalls are recommended.

Wash the teats and udder of the cow with warm water and soap and dry with a clean cloth. Disinfect the navel of the calf by opening the navel cord and applying tincture of iodine. The calf should receive colostral milk as soon as possible after birth.

Avoid overfeeding. The common practice of keeping the calf with the cow continuously for 12 to 24 hours or longer after birth is likely to result in overfeeding the calf, with subsequent indigestion, scours, and death. This is particularly true when the cow has a large amount of milk shortly after calving. A safer practice is to allow the calf to nurse for four or five minutes and then separate it from the cow. This is repeated at 5- or 6-hour intervals, or an average of about four times during 24 hours. A panel can be placed across one corner of the boxstall and the calf kept in this pen between nursings. This plan is followed for three to five days, when hand-feeding is begun. *Overfeeding is probably the most frequent cause of scours in newborn calves.*

Pneumonia is often a complication following scours or other digestive disturbance. In cold weather the calves must be kept warm and dry. Burlap sacks make satisfactory blankets.



Young calf with scours and pneumonia

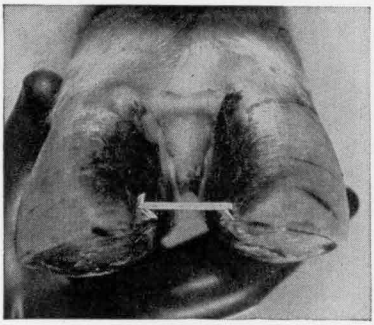
Calves that develop scours should be isolated and fed 4 or 5 ounces of corn sirup plus 2 or 3 raw eggs and 1 ounce of castor oil once or twice daily. Blood transfusions and other treatment by a veterinarian may be necessary. Calf-scour serum, as well as anti-hemorrhagic-septicemia serum, is often used in the treatment and prevention of this disease. *For further information see Reference 5, page 46.*

Coccidiosis is characterized by bloody diarrhea, unthriftiness, lack of appetite, failure to gain weight and, in advanced cases (especially in calves), emaciation, weakness, and death.

The control suggested for the disease includes isolation of affected animals and thoro cleaning of stables, feed bunks, etc. The giving of ½ pint to 1 pint of 1-percent copper-sulfate solution twice weekly as a drench may be helpful. This should be continued for one to four weeks, depending upon the response of the animal. Quite naturally, doses must be light for small animals, especially for those already weakened. A veterinarian should be consulted if the condition is not readily controlled.

Foot rot (foul foot) is responsible for lameness, loss of condition, and lowered milk production in cattle. Preventive measures include the frequent removal of manure and soiled bedding and adequate drainage of barn lots and pastures. The area around feed racks must be kept clean. Treatment of affected animals consists of removing necrotic (dead) tissue from the affected area, together with the application of a saturated solution of potassium permanganate, air-slaked lime, or tincture of iodine. Mild cases of foul foot often clear up if the animals are placed in a dry lot.

Treating the affected parts with a 10-percent copper-sulfate solution is necessary in severe cases. If many animals are affected, a trough can be built in which to give the animals a foot bath with this solution. It may be necessary to trim away parts of the hoof in order to get the antiseptic to the infected tissue. This should be done by a trained person. The treatment may then be applied by means of a foot bath or a soaked bandage.



Foot rot

The type and strength of solution employed will depend upon the method of application. Strong vinegar or a saturated solution of potassium permanganate may be used when the material is to remain in contact with the tissues. Several treatments given at intervals of two or three days are often necessary to overcome infection.

Grubs (warbles) cost the cattle industry about $50,000,000 a year. The fly that is responsible for these grubs is called the warble or heel fly. It is seen flying actively about the heels and hocks of cattle on warm summer days. The eggs of the flies are deposited on the hairs of cattle. After hatching, the larvae penetrate the skin and migrate to their location on the back, which they reach early in December in this part of the country. Then they puncture the skin and remain for some time as the familiar warble. Early in the spring they emerge, drop to the ground, and become mature flies.

The life cycle of this pest can be broken by killing the grubs while they are under the skin of the animal. They may be removed by hand or treated with the following mixture: 1 gallon of water, 12 ounces of derris or cube containing 5 percent of rotenone, and 2 ounces of soft soap. Boil soap in a quart of water, cool, and add derris or cube. Add enough water to make one gallon. Scrub backs of cattle with mixture, using a stiff brush. Repeat three or four times at monthly intervals.

A mixture of petrolatum 5 parts and iodoform 1 part rubbed into the openings is also effective. Oil or grease applied in the same manner may also give satisfactory results. Benzol, injected thru the opening by means of a hand oilcan, is sometimes used.

When large numbers of animals are to be treated for grubs, use a spray and apply it with a power orchard sprayer (250 pounds pressure) that has a No. 5 disk (5/64-inch) in the nozzle. Hold the nozzle about 2 feet from the backs of the animals. To prepare the spray, mix 10 pounds of wettable sulfur with 5 pounds of derris or cube powder (5 percent of rotenone). Then measure out 100 pounds of water, and use

some of it to make the powder mixture into a thin paste and add the paste to the rest of the water, stirring constantly.

To be successful, campaigns to eradicate the grub should be carried out on an area basis; one owner can accomplish little if his neighbors allow infestations to go untreated.

Lice cause lowered vitality, reduce the quality and quantity of animal products, and may spread disease. They can be controlled by: (1) maintaining clean, roomy houses or stables, (2) regular inspection of animals, (3) prompt isolation and treatment of affected animals.

Treatment consists of the application of insecticides, either dry or in solution, depending upon the kind of animal to be treated and the time of year. For **swine,** crude petroleum, crankcase oil, and kerosene emulsion are helpful, crude petroleum probably being the best. These may be applied by hand, by spraying, sprinkling, or dipping, depending upon facilities and weather conditions. For **horses, beef cattle,** and **sheep,** sodium fluoride may be employed against biting lice. To get rid of sucking lice, a contact poison such as a rotenone-sulfur mixture, arsenicals, coal-tar creosote, and nicotine are necessary. For **dairy cattle** pyrethrum powder is effective when rubbed into the hair on the parts of the body infested with lice. For **poultry** see page 41.

When equipment is available, the best way to treat animals for lice is to give them two dippings about two weeks apart. A satisfactory dip consists of: 100 pounds of 325-mesh wettable sulfur and 10 pounds of derris or cube powder (5 percent of rotenone) in 1,000 gallons of water. *For further information see References 11, 28, 29, 30, 32, and 33, page 47.*

Lungworms are responsible for heavy losses in calves. These parasites crawl into the air passages and cause unthriftiness and pneumonia. Death often results from pneumonia.

There is no satisfactory treatment for these worms. They can be prevented and controlled by keeping calves away from poorly drained pastures and by cleaning and disinfecting barns and lots.

Mad itch (pseudorabies, or Aujeszky's disease) has for many years occurred in outbreaks thruout the corn belt. The virus has been isolated from live animals delivered to the University of Illinois Department of Ani-

Steer with mad itch

mal Pathology and Hygiene. Intense itching is usually a characteristic of this disease. The animals continuously rub the head or the areas of the body where the itching occurs.

It is important that hogs be removed promptly from cattle pens where this disease occurs. In fact, hogs suffer from a mild type of the disease without giving any visible symptoms, and they transmit the disease to cattle. It is also advisable to fatten the hogs and market them. There is no proved treatment for the malady.

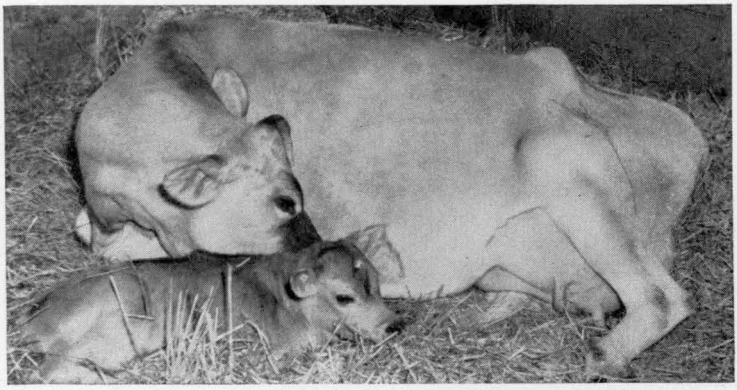
Mastitis (garget) is a serious disease of dairy cattle. It may be acute or chronic and may cause not only a decline in milk production but destruction of the udder. The disease is spread by contaminated equipment or hands of the milker and by dirty barns and yards. It may follow injuries to the udder and improper milking. Repeated attacks may cause a gradual hardening of one or more quarters. The symptoms are clotted and watery milk, "caked bag," heat, pain, swelling, and change in the shape of the udder.

Chronic mastitis

To prevent this disease many precautions are necessary: (1) Keep the barn, stalls, and gutters clean; (2) avoid overcrowding the cows and use plenty of bedding; (3) do not milk onto the floor, (4) dry off cows carefully, (5) treat minor wounds of udder and teats promptly, (6) avoid use of teat plugs and tubes, (7) allow no wet hand milking, (8) wash udder with soap and water or chlorine solution and dry before milking, (9) use separate, clean wash cloth for each cow, (10) wash and dry hands after milking each cow, (11) follow directions carefully when using a milking machine, (12) quarantine and test newly purchased animals for evidence of mastitis, (13) keep management methods constant, or make changes gradually.

Recent advances in treatment include the injection of colloidal silver oxide, acriflavine, gramicidin, and other disinfectants into the udder. These should be used under the supervision of a qualified veterinarian. *For further information see References 6 and 7, page 46.*

Milk fever cannot be prevented in all cases by any known method of feeding. Affected cows have a wobbly gait, lie down, lose their appetite, and are sleepy. A balanced ration that includes adequate amounts of the essential vitamins and incomplete milking during the first two or three days after calving may prove beneficial in preventing an attack in some cows.

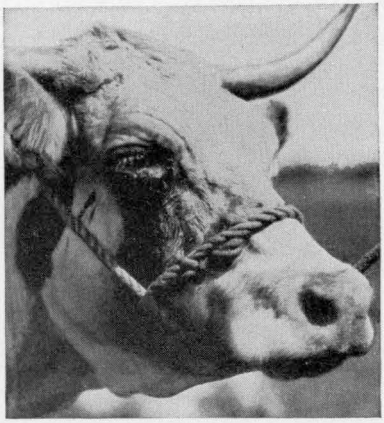


Cow with milk fever

When symptoms of milk fever appear, call a veterinarian promptly. *Do not attempt to drench the cow—often she cannot swallow. Inflating the udder with air may result in mastitis (garget).*

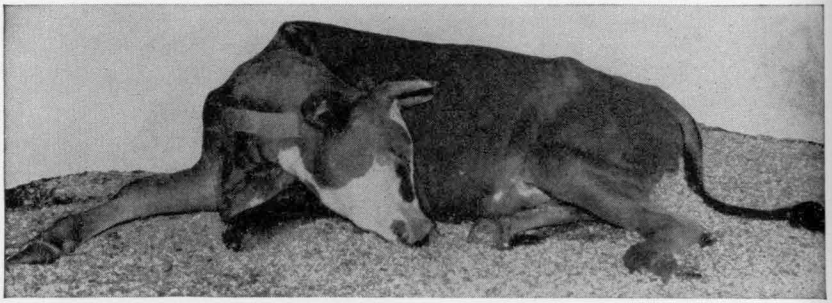
Pinkeye (infectious keratitis) is contagious and may spread thru an entire herd. Cattle suffering from it should be isolated in a dark stall or barn to protect their eyes from light and to help prevent flies from spreading the disease. Several daily treatments of the eyes with mercurochrome, 5-percent argyrol, or 4-percent boric acid may give good results, altho a few weeks may be necessary for recovery. A 1-percent solution of silver nitrate applied every second day has also been helpful. This solution must be put in brown glass bottles and kept away from light or its potency will be destroyed.

Keratitis bacterins have been employed in the prevention and treatment of this disease in calves, with varying results.



Pinkeye

Poisonous plants may cause sudden and serious losses among the various types of livestock. The deadly nightshade, wild cherry, ground cherry, whorled milkweed, white snakeroot, jimson weed, and young cockleburs are the most common offenders in Illinois. Losses can be prevented by destroying these plants or by keeping animals away from them.

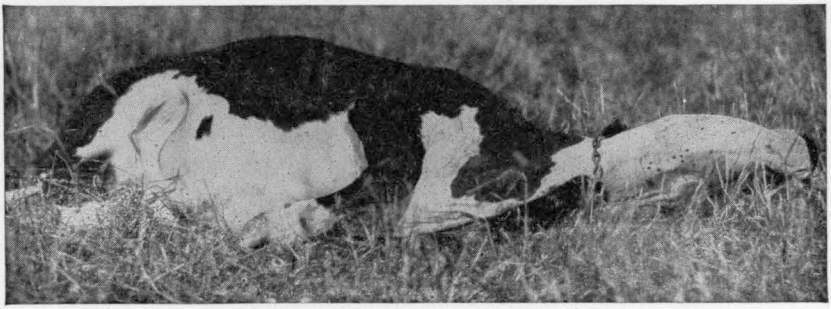


White snakeroot poisoning

When plant poisoning is suspected, call a veterinarian immediately, for animals with some types of plant poisoning can be saved by prompt treatment. Keep animals out of suspected pastures until a survey can be made to determine whether there are any dangerous plants in it. Measures for eradicating poisonous plants depend on the nature of the plant. *For further information see Reference 8, page 46.*

Prussic-acid poisoning (hydrocyanic-acid poisoning) in livestock is usually due to their eating either wild cherry (particularly the wilted leaves), Sudan grass, canes, or sorghums. Stunted drouth-stricken, or frosted sorghum may contain a deadly amount of hydrocyanic acid, or the glucoside from which it is formed, in a small amount of plant material. The shoots of second-growth or volunteer sorghum and Sudan grass may be especially dangerous. Mature Sudan grass and sorghum, as well as hay and silage made from these and similar grasses, can usually be fed with very little danger. It is advisable, however, to allow silage to remain in the silo for four to six weeks before feeding it.

Hydrocyanic-acid poisoning seems to occur most often in cattle. Early treatment may save the lives of affected animals. A quart or



Death caused by prussic-acid poisoning

two of molasses diluted with water in a drench may be helpful, but a veterinarian should be called immediately so that additional and more specific treatment may be given. If a drench is given, care must be taken that none of it enters the lungs.

Ringworm is a contagious disease of the skin caused by a fungus. It can be transmitted to other animals and to man either directly or by contaminated ropes, halters, mangers, stalls, etc. The round, scaly, hairless patches that characterize this disease are usually found on the shoulder, brisket, flank, rump, back, or head and neck. Scabs are sometimes formed on the skin. The area first affected becomes normal, but new spots often appear.

Strict sanitation is essential in the control of ringworm. Either tincture of iodine or a saturated alcoholic solution of salicylic acid repeatedly applied to the affected area may kill the fungus. Applications of vinegar, tho less effective, may sometimes be helpful.

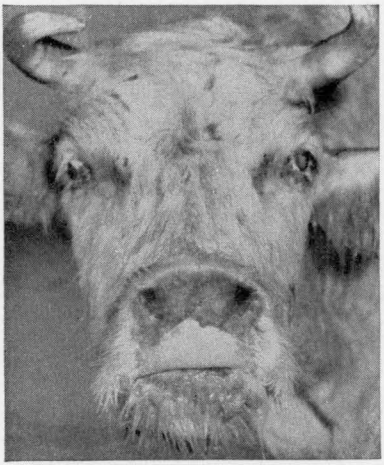
Heifer with ringworm

Shipping fever (pasteurellosis, or hemorrhagic septicemia) is a type of pneumonia to which feeder cattle are especially susceptible. Fatigue, irregular feeding, and exposure during shipping are believed to so lower the resistance of the cattle that they readily contract this disease.

There is some evidence that in susceptible animals vaccination may produce a measure of immunity. Best results are obtained when cattle are vaccinated two weeks before they are shipped. After the cattle arrive in the feedlot, they should be protected from cold winds and rain. In good weather cattle may be turned into open pastures. Feeding should be light during the first few days and should include a liberal amount of wholesome roughage and oats.

Sick animals should be isolated promptly. Anti-hemorrhagic-septicemia serum is often used in the treatment of affected animals, together with appropriate doses of sulfanilamide or a related drug. In the treatment of healthy animals previous to exposure, hemorrhagic-septicemia bacterins are useful.

Sore mouth (mycotic stomatitis) often occurs in cattle pastured on legumes such as alfalfa, white clover, and sweet clover. Ulcers or sores, often resembling lesions of foot-and-mouth disease, frequently develop about the mouth and lips and occasionally on the feet, udder,



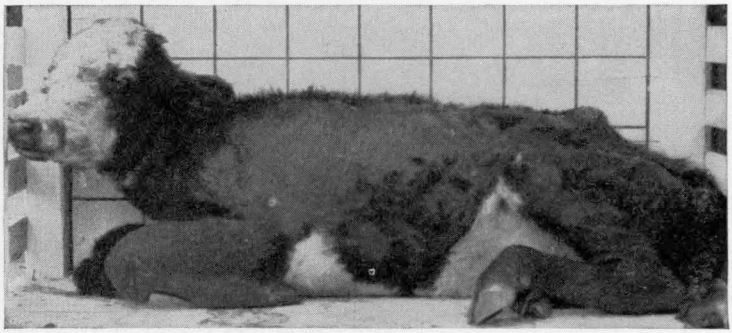
Sore mouth

and other parts of the body. The cause is believed to be a fungus that grows on the roughage. Besides the sores about the mouth, there is usually lack of appetite and rapid loss of condition. Recovery usually occurs when the cattle are taken out of these pastures and fed grain mashes or gruels and good-quality leafy hay.

Local daily treatment, including potassium-permanganate solution, boric acid, salt solution, or a mixture of 9 parts glycerin to 1 part tincture of iodine, hastens the healing of the sores. Since this disease is not easy to distinguish from foot-and-mouth disease, outbreaks of this nature should always be called to the attention of a veterinarian.

Stomach worms may cause serious harm to cattle, especially on poorly drained pastures. Severe infestation in young animals may even result in death. Symptoms of stomach worm infestation are loss of condition, weakness, rough hair coat, and diarrhea. Preventive measures include (1) using only well-drained pastures, (2) providing drinking water from wells or from rapidly flowing streams, and (3) practicing sanitation and supplementing poor pasture with extra feed.

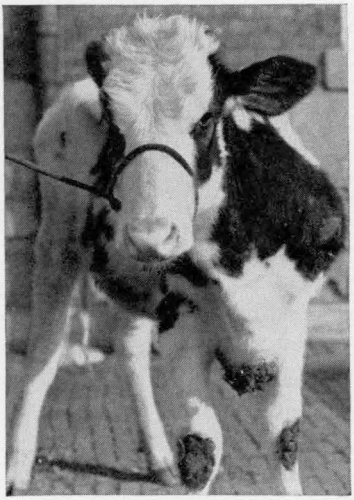
Treatment of affected cattle with appropriate doses of copper sulfate or phenothiazine is beneficial if the harm caused by the worms has not been too severe. The dosage of copper sulfate varies from 1/10 gram dissolved in 2 ounces of water for calves, to 5 grams dissolved in



Steer heavily infested with stomach worms

1 pint of water for yearlings. The latter treatment can be repeated twice a week in mature animals. Phenothiazine is given in capsules, boluses, or a liquid, in dosages varying from 5 grams for small calves to 60 grams for mature cows.

Sweet-clover poisoning occasionally causes serious death losses in both beef and dairy herds. Poisoning from moldy, spoiled, or damaged sweet-clover hay is probably the most common form encountered, but the disease has been caused also by cattle eating large amounts of damaged sweet-clover silage. The death loss in one dairy herd fed moldy sweet-clover silage exceeded $1,500. Some of the poisoned animals in this herd recovered after they were given blood transfusions.



Sweet-clover poisoning

Losses reported as following the eating of green sweet clover on pasture have not proved authentic. Moldy sweet-clover hay, and presumably moldy silage also, often contains a substance that diminishes or destroys the clotting power of the blood. Hemorrhages occur beneath the skin and into the internal organs of the body. Animals with this disease may bleed to death after surgical operations such as castration and dehorning. Newborn calves often develop fatal hemorrhages when their dams are fed damaged sweet-clover hay or silage during pregnancy. Cows also may die from hemorrhage following calving. The best way to prevent the disease is to avoid feeding damaged sweet-clover hay or silage.

If damaged hay or silage is fed to cattle, the danger from poisoning can be reduced by feeding an equal amount of alfalfa or other roughage or, preferably, twice as much alfalfa. Poisoned animals frequently make prompt recovery when given a blood transfusion with blood taken from cattle that are not suffering from this disease.

Warts in young cattle are commonly seen on the head, neck, and shoulders; in cows they occur frequently on the udder and teats. In young cattle their chief importance is in the damage to the hides and to the appearance of the animals. In dairy cows warts on the udder interfere with milking.

These warts are infectious and capable of spreading from one animal to another. In dairy herds, affected cows should be milked last and the hands of the milker carefully washed and disinfected afterward.

Warts which are small at the point of attachment may be clipped off or tied off tightly near the base. Tincture of iodine should be applied to the stump in either case. Very large warts may be removed by surgical

Bull with warts

operation. Small warts, such as those often seen on the udder, may disappear if olive oil or castor oil is applied daily. A 10-percent solution of salicylic acid applied at weekly intervals is often effective also. A wart vaccine is now in the experimental stage; its effectiveness has not been established.

On January 1, 1943, there were on Illinois farms 3,212,000 cattle, 6,858,000 hogs, 874,000 sheep, 26,832,000 chickens, 453,000 horses, and 62,000 mules. Cash sales of livestock and livestock products in 1942 amounted to $629,880,000. Many Illinois farmers count on yearly sales of $10,000 from their livestock.

This means a tremendous investment and one that is worth giving every protection.

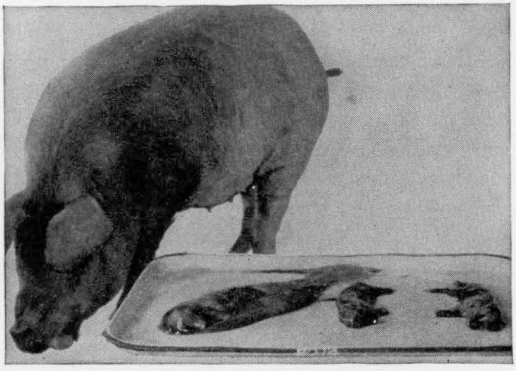
SWINE . . .

Disease prevention. The *McLean county system of swine sanitation,* thoroly applied, will keep many kinds of swine parasites and disease germs below the danger level. Clean and scrub the farrowing pens with scalding lye water (1 pound of lye to 20 or 30 gallons of water) and then rinse with clear water. After removing all loose dirt, wash the sow with soap and water just before she is placed in the clean farrowing pen. Keep the bedding clean and dry. Whenever the season permits, haul the sow and litter to a clean pasture not later than two weeks after farrowing and provide a separate house for them. Give sows and litters access to clean pasture only. Keep the pigs on uncontaminated ground until they are at least four months old. *For full details on McLean county system see Illinois Circular 306.*

Other measures to prevent disease include avoiding overstocking or purchasing diseased animals. Feed balanced rations and make necessary changes in feeding or management gradually. *For further information see References 1 and 13, pages 46 and 47.*

For hog cholera follow a definite program of immunization. If swine erysipelas becomes a herd problem, the culture-serum method of immunization is recommended. When disease appears in the herd, isolate sick animals immediately. Many of the symptoms of different diseases overlap, and laboratory tests may be necessary.

Abortion, infectious (brucellosis, or Traum's disease) in swine may or may not terminate in abortion. Diseased sows, whether they abort or not, may spread the infection at the time of farrowing, and infected boars may communicate the disease to sows at the time of service. The infectious type of abortion is communicable to cattle, but the cattle type is seldom found in swine. Brucellosis of swine may be communicated to man. Therefore do not handle aborted pigs or afterbirths without gloves.



Abortion caused by brucellosis

Infected swine can be detected by blood tests. Project 1046 of the Extension Service, College of Agriculture, includes a plan for accrediting swine herds free from brucellosis. *For further information see References 9 and 10, page 47.*

Anemia, nutritional (suckling-pig anemia) is particularly prevalent in pigs that are farrowed in late fall, winter, and early spring and, because of inclement weather or for other reasons, are confined to floored pens without access to soil or vegetation. The disease may appear in young pigs two to seven weeks old.

To prevent anemia, get the sow and pigs out on pasture as soon as conditions permit. In the meantime place a few shovelfuls of sod or soil in the pen. Take this soil from areas not previously occupied by swine, so that no worm eggs will be brought into the pen. Greater protection against anemia is afforded if the soil is enriched with a few cupfuls of the following solution:

Iron (ferrous) sulfate	1.0 pound
Copper sulfate	2.5 ounces
Water	3.0 quarts

The mixture may also be applied daily to the udder with a swab or brush, but this is not usually necessary if fresh sod is supplied.

Baby pig disease (acute hypoglycemia in newborn pigs) is often developed by entire litters of apparently normal, strong, vigorous newborn pigs during the first two or three days after farrowing. The blood-sugar level is subnormal. Shivering, dullness, and a lack of desire to nurse are typical symptoms. Finally there is coma, followed by death of several or all the affected pigs within 36 to 48 hours after the first symptoms are observed.

Measures for the complete prevention of hypoglycemia have not been developed because all factors responsible for the disease are not known. Losses can be greatly reduced, however, by feeding sows a liberal well-balanced grain ration (1 to 1.75 pounds daily per hundredweight, including bright green legume hay) during pregnancy, particularly during the last few weeks of gestation. Unborn pigs need increasing amounts of essential nutrients. Also, liberal feeding at this time will help to assure to newborn pigs a prompt and sustained milk flow. If the udder is feverish after farrowing, the application of hot packs and a laxative diet are recommended.

Entire litter affected with baby pig disease

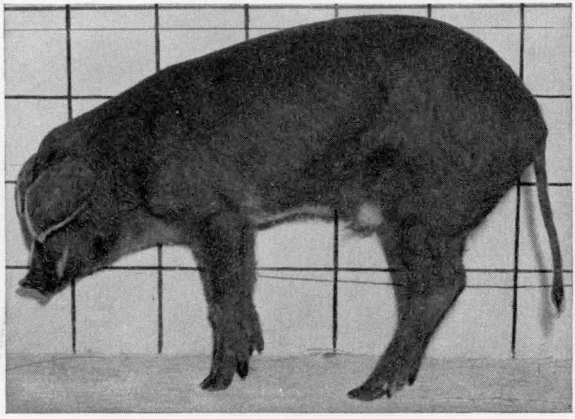
During the first 72 to 90 hours newborn pigs should be carefully watched for such symptoms as loss of appetite, rough coat, loss of condition, and lowered vigor. Any pigs that develop these symptoms should be separated from the sow and hand-fed, but care must be taken to keep them from chilling. A large proportion of pigs treated in this early stage can be saved.

Corn sirup diluted with an equal amount of warm water is good for early hand-feeding. Give each pig 1 or 2 teaspoonfuls every two or three hours night and day. Later, when the appetite has returned, modified cow's milk can be used and night feeding can be discontinued. To 2 quarts of whole milk add the white of 1 egg, 3 ounces of cream, and 3 ounces of lime water. Heat to about 100° F. If there is no evidence of scours, whole cow's milk or equal parts of unmodified whole milk and skimmilk will also give satisfactory results. The exact amount of sirup or milk to give the pigs will depend on their age, vigor, and appetite. Too much may cause scours. One pint of milk every 24 hours for each pig should be adequate.

After several hand-feedings it may be advisable to return the pigs to the sow if she is giving enough milk and the udder is not affected with mastitis (garget). Pigs need not be hand-fed after they are four to five days old. At this time they should be given modified cow's milk or the mixture of whole and skimmilk, which they will soon learn to drink from a shallow pan or trough. *Clean the trough before each feeding. For further information see Reference 13, page 47.*

Cholera is a highly fatal and contagious disease of swine that attacks the vital organs. It is often complicated by inflammation of the bowels and pneumonia, and ends in death in 3 to 10 days.

Symptoms of cholera in swine include loss of appetite, fever, drooping ears, gummy eyelids, weakness, red or purplish spots on the nose,



Pig with cholera

ears, or abdomen, rough coat, vomiting and diarrhea or constipation. Some animals may die in two or three days after showing symptoms; others may survive a week or longer.

Appropriate doses of potent anti-hog-cholera serum and virus will protect healthy pigs against the disease. While the serum given in large doses without the virus may be helpful in the early stages of the disease, it cannot be relied upon to cure affected animals. The dosage of serum and virus varies with the size of the animal. When hog cholera is suspected, the veterinarian should be called to make a diagnosis in order that proper means of control may be worked out.

Two new vaccines for hog cholera, Dorset's and McBryde's crystal violet and B. T. V. (Boynton's Tissue Vaccine) may prove valuable in the never-ending battle against this disease. Both products should, however, still be considered experimental. Their chief advantages are that they contain no live virus, and thus they remove one of the greatest hazards of the serum-virus method, namely, reactions following vaccination. Furthermore, because pigs vaccinated by the new method are allowed to stay on full feed during the immunizing period, they gain weight faster than serum-virus treated pigs. Disadvantages of the new B. T. V. and the crystal violet vaccine are that it takes as long as three weeks to confer full protection, and the immunity induced is not so durable as that following serum-virus inoculation.

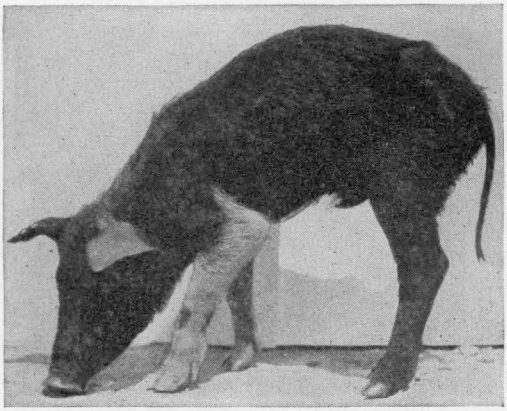
As scrupulous care is necessary when using these vaccines, all syringes, equipment, and even boots and clothing must be free from any possible contamination with the hog-cholera virus. When there is an outbreak of hog cholera or one is likely to occur because the disease is present in the community, anti-hog-cholera serum is recommended because it provides immediate protection. If there is no other disease present, the serum-virus method may be employed.

Enteritis (necro) has many so-called cures, but treatment is often ineffective. Sanitation and good management offer the most hopeful approach to the control of this serious disease.

To prevent necro, follow the *McLean county system of swine sanitation.* Feed balanced and complete rations. Immunize pigs against hog cholera away from pastures and lots used for sows and fattening hogs, and avoid the purchase of infected swine. Since experience has shown that feeder pigs are especially susceptible to necro and perhaps other forms of enteritis, *newly purchased hogs should be quarantined for three weeks before they are allowed to run with the rest of the herd.*

Feeding oats that have been soaked in water to which an alkaline compound has been added is recommended as a treatment for enteritis. Various alkaline compounds are available and when properly used are helpful in the early stages of the disease. Copper-sulfate solution has also been recommended—1 pound of copper sulfate dissolved in 1 gallon of hot water, together with 2 cans of lye and 2 pounds of salt. One

to two pints of this solution is added to 40 gallons of water in which the oats are to be soaked or to 40 gallons of drinking water for a period of four to seven days. The commercial alkaline solution is generally considered more effective than the copper-sulfate solution. *For further information see Reference 12, page 47.*

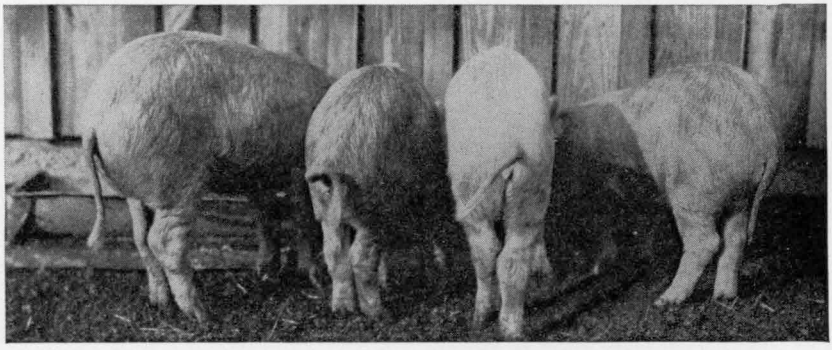


A severe case of enteritis

Erysipelas in swine is caused by a germ that can live for a long time in the soil or in the carcasses of pigs that have died from the disease. The disease is spread by contact with sick pigs and contaminated houses and lots and by the eating of uncooked garbage containing infected pork.

There are several forms of erysipelas in swine, but they are all caused by the same germ. Acute swine erysipelas is often difficult to distinguish from hog cholera and other diseases. Chronic cases often show large joints. Doubtful cases should be sent to a laboratory for diagnosis.

The culture-serum treatment for swine erysipelas is being tried out in a limited number of herds in Illinois under the supervision of the State Department of Agriculture and the Federal Bureau of Animal Industry, and it is recommended when swine erysipelas becomes a definite herd problem. See a local veterinarian to obtain the application blanks which must be filled out by the owner before the culture



Enlargements about the joints caused by chronic erysipelas

is applied. There is no charge for the culture, but the owner is obliged to pay for the serum as well as the services of the local veterinarian. Anti-swine-erysipelas serum alone provides only temporary immunity. The culture-serum treatment protects for approximately six months.

Since swine erysipelas is transmissible to man, gloves should be worn while handling sick pigs. Swine erysipelas may also cause disease in turkeys and lambs. *For further information see References 16 and 17, page 47.*

Influenza in swine makes its appearance with the return of cold weather in the fall. Lack of appetite, listlessness, coughing, and nasal discharge are characteristics of this disease. Fatal cases end in pneumonia.

When swine "flu" strikes, a high percentage of the herd is affected, but prompt control measures reduce losses to a low level. Medicine is not so important as rest and management, but the guaiacol compounds help to alleviate symptoms.

Preventive measures for swine influenza consist of providing clean, dry, warm houses with plenty of bedding. Measures which prevent rooting and possible contact with earthworms are also helpful, since the disease is carried by the swine lungworm, which in turn passes part of its life cycle in the earthworm. All new additions to the herd or animals returning from shows should be quarantined for thirty days.

There is no specific vaccine or serum for this disease.

Lice. See page 13.

Mange causes pigs to make poor gains. Unthriftiness, loss of hair, and "elephant hide" are suggestive of mange.

Clean, roomy quarters and isolation and treatment of affected animals are usually effective measures of control. Treatment may consist of dipping or thoroly spraying or scrubbing the animal with crude oil or used crankcase oil. Sulfur oil or lime-sulfur solution is also recommended. To prepare the lime-sulfur solution, use enough water with 7.5 pounds of slaked lime and 12.5 pounds of flowers of sulfur to make a paste. Then add 5 to 10 gallons of water and boil the mixture until it is a deep orange-purple. Strain thru a cloth and add enough water to the fluid to make 50 gallons. Hand-dress the affected animals with a stiff brush, using 5 percent of flowers of sulfur in oil or 2 parts of used crankcase oil to 1 part kerosene. Commercial concentrated lime-sulfur can be purchased and diluted according to the directions on the container. If lime-sulfur orchard or tree spray is used, it should be diluted with equal parts of water. *For further information see References 11 and 15, page 47.*

Pneumonia may result from any one of a number of conditions or combinations of conditions, such as exposure to cold, drafty houses, sudden changes of weather, overcrowding, changes in feeding or management, worm infestation, shipping, or giving the double vaccination against hog cholera when the animals are not well.

Preventive measures include: (1) providing clean, dry roomy shelter free from drafts, (2) rotating and cultivating hog lots and pastures, (3) feeding a complete ration, (4) avoiding sudden changes in management, (5) purchasing only pigs that are not likely to be infected or wormy, (6) avoiding vaccination of pigs suffering from other diseases.

Pox in swine is characterized by well-defined pocks on the skin. Two types of the disease exist: one in which the pocks are largely confined to the belly, and the other in which they are more generally distributed. The individual pocks may be as large as a dime. Pigs suffering from severe swine pox make poor gains and should not be immunized against cholera until the pox subsides, which takes four to six weeks.

Since lice may spread swine pox, lousy pigs should be treated with crude oil or used crankcase oil and the houses should be cleaned and disinfected.

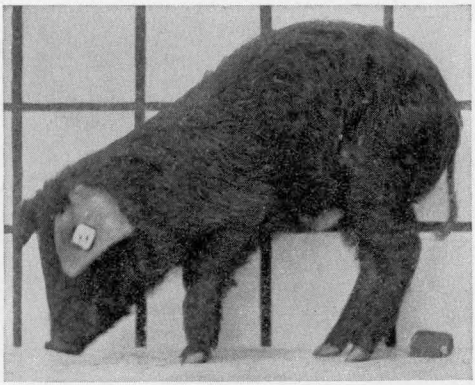
Trichinosis is caused by a microscopic roundworm. The young of this parasite migrate from the intestines by way of the circulation into the muscles of the animal. Hogs become infested by eating contaminated slaughterhouse offal, garbage containing scraps of infested pork, or infested rats.

No symptoms of trichinosis are observed in swine, but when meat infested with young trichinae is eaten by man without being thoroly cooked, the young trichinae develop in the human intestines and the second generation invades the muscles and causes serious illness.

To prevent swine trichinosis do not feed hogs uncooked slaughterhouse offal or garbage containing pork scraps, and get rid of rats. The disease in man can be prevented by thoroly cooking all pork that is eaten.

Worms can be effectively controlled by the *McLean county system of swine sanitation.*

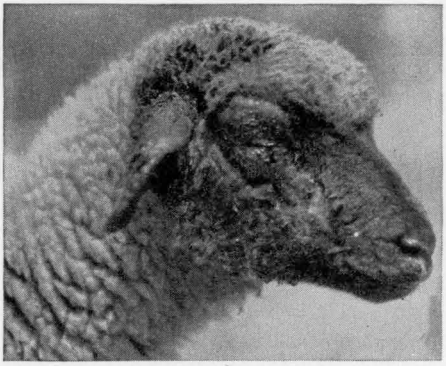
In the treatment of roundworms in pigs, oil of chenopodium is recommended. Mix ½ pint of the oil with sufficient castor oil to make 1 gallon. Give each pig 1 ounce (2 tablespoonfuls) of this mixture for each 50 pounds of live weight. Fasting the pigs for 24 to 36 hours before treatment is necessary. *For further information see References 11 and 18, page 47.*



Stunted by heavy worm infestation

SHEEP . . .

Bighead has occurred in summer in flocks of native sheep, but the most serious outbreaks have been observed in late summer and early fall in western feeder lambs. In most outbreaks the disease appeared within a few days after the lambs arrived in the feedlots. In mild cases there are slight swellings of the ears, eyelids, and lips. The animals rub or scratch the affected parts. In more severe cases the skin of the entire head and ears becomes swollen. Eating and drinking may be difficult and breathing labored.



Ewe with "bighead"

"Bighead" appears to be associated with: (1) sensitization of the skin to sunlight, probably caused by eating certain plants, and (2) exposure to strong sunlight. No specific treatment has been found, but the condition can be largely prevented by providing shade for the lambs and keeping them out of weedy pastures. Giving them a liberal feeding of hay in the morning before they graze, or keeping them in a shed out of direct sunlight until late afternoon are alternative preventive measures.

Blowflies and screwworm flies may breed on live sheep. Blowflies normally breed in decaying carcasses but they are also attracted to moist, soiled wool or hair on living sheep and goats. The screwworm fly is not native to Illinois but may migrate to the area during the summer. It breeds only in wounds on living animals.

To prevent losses from blowflies, keep sheep clean, dry, and closely tagged. Clip off especially all tags of matted wool about the tail and flank. Castrate and dock lambs before the fly season, and bury or burn all dead animals. Clear away underbrush from sheep runs. Fly traps are useful. Pine oil may be applied to wounds to keep out the fly maggots.

When infestation with either blowfly or screwworm maggots occurs, the wound should be treated with the following mixture:

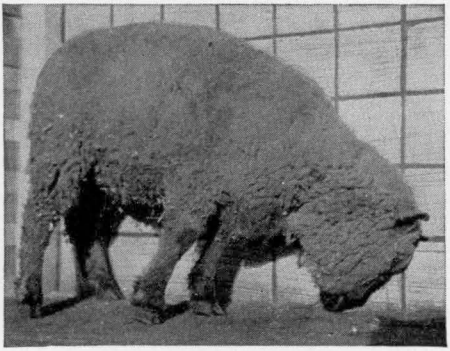
	Parts by weight
Diphenylamine (technical grade)	3.5
Benzol (commercial)	3.5
Turkey-red oil (sulfonated castor oil, pH 10 or neutral)	1.0
Lampblack (Germantown)	2.0

For directions on mixing see Illinois Circular 534, The Sheep Enterprise. **Keep mixture away from fire.** It is highly inflammable.

Clip the wool from the affected area and apply the mixture with a paint brush. Repeat twice weekly until the tissues are healed.

Circling disease (listerellosis, or encephalitis) has occurred in many flocks in Illinois. Mature sheep as well as feeder lambs may be affected. Walking in circles, blindness, and coma are common symptoms.

Vaccination for listerellosis has not yet proved effective. Sulfanilamide has been employed in the early stages with apparently favorable results.



Lamb with circling disease

Lice. See page 13.

Mastitis (caked udder, or blue bag) is an infectious and contagious disease of the mammary gland. It may either be acute or chronic. The acute type occurs most often shortly after lambing and runs a rapid and usually a fatal course. The first symptoms are lameness and limping accompanied by loss of appetite. Ewes affected with chronic mastitis have hard, lumpy udders.

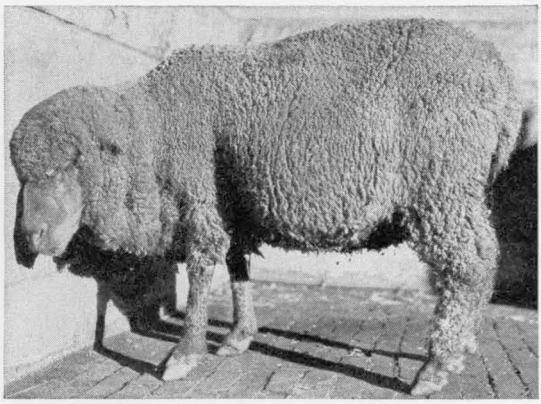
To control mastitis, promptly isolate affected animals. Apply hot packs to their udders and allow the lambs to nurse often. Lambs that have nursed affected ewes should not nurse other ewes but should be hand-fed. Ewes with chronic mastitis should be marketed. Sulfanilamide may be given as a drench in the early stages of the disease.

Overfeeding on grain is a common cause of severe losses in feeder lambs. The losses usually occur either shortly after the lambs have been turned into a stalk field with a large amount of shelled corn scattered over the ground, or late in the feeding period when the lambs are on full feed.

If lambs are allowed access to an entire field, many of them may overeat. The stomach becomes gorged with grain and fatal indigestion develops. Restricting the flock to a small area by means of a temporary fence or some other plan will reduce losses from overeating to a minimum.

The lambs that die from overeating late in the feeding period are generally the best feeders in the flock. The margin between a safe and a dangerous ration of grain is not very great. When losses from overfeeding occur, they can be stopped almost at once by reducing the grain ration to about 1 pound per lamb daily and increasing the roughage. As soon as the danger is over, the grain ration can be increased again, but the change should be gradual.

Pregnancy disease (ketosis, or lambing disease) often causes serious losses in flocks that are not properly fed or are too closely confined during pregnancy. Symptoms are lagging, dullness, difficulty in walking, and eventually inability to stand. Few cases develop in flocks that are fed a legume roughage, such as clover or alfalfa hay, plus a liberal allowance of grain during the last eight, six, or even four weeks before lambing.

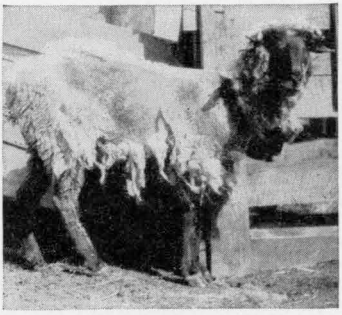


Pregnancy disease

For flocks that show symptoms or have a history of pregnancy disease, the amount of grain fed should be increased during the last few weeks before the beginning of the lambing period. Each ewe should get not less than ½ pound of grain a day. A greater margin of safety is assured if about 1 pound a day is allowed for each ewe during the last month of pregnancy. As an additional preventive measure, it is recommended that the grain mixture be supplemented with ¼ pound of blackstrap molasses daily per head. This may be mixed with the grain. Ewes should have a moderate amount of exercise every day during pregnancy.

Scab (mange) is one of several serious diseases of sheep caused by parasites. Small mites that cannot be seen with the unaided eye cause irritation and crusts or scabs on the skin, loss of wool, and unthriftiness.

Sheep scab can be controlled by quarantining and dipping. When scab is found in a flock, notify the CHIEF VETERINARIAN, STATE DEPARTMENT OF AGRICULTURE, *Springfield*. Such a flock will be placed under the immediate supervision of the Division of Livestock Industry, State Department of Agriculture.



Severe case of scab

A flock of sheep affected with scab, or mange, should be treated in the following way: Shear sheep if necessary, and break up any scabs. After watering them, dip them in a lime-sulfur solution prepared as follows:

To 15 pounds of slaked lime and 25 pounds of flowers of sulfur add enough water to make a paste. Then add 10 to 20 gallons more of water to the paste and boil until a deep orange-purple. Clear the liquid by straining it thru a cloth, and then add enough water to make 100 gallons.

Keep the sheep in this dip for two full minutes and push their heads down several times. Then hand-dress the ears and the bases of the horns with a stiff brush, using 5 percent of flowers of sulfur in oil or 2 parts of used crankcase oil to 1 part kerosene. Turn dipped sheep into clean pens or lots. Repeat the treatment after nine or ten days to kill any mites that may have been hatched after the first dipping.

Concentrated lime and sulfur solution can be purchased for dip. It is diluted according to directions on the label. Deaths may occur if sheep of low vitality are dipped during cold weather.

Shipping fever (hemorrhagic septicemia, or pasteurellosis) usually develops during the first two weeks after feeder lambs arrive at the farm. Many of the lambs that are first affected die within 24 hours. Symptoms are dullness, discharge from eyes and nose, coughing, and sneezing. Cases that develop more slowly may end in pneumonia.

In checking the progress of hemorrhagic septicemia, isolation of the sick lambs and good care are often effective. Vaccination appears to be helpful in certain outbreaks and ineffective in others. Best results can be expected when the lambs are vaccinated before the disease appears in the flock and preferably two weeks before shipment. Anti-hemorrhagic-septicemia serum may be used in the treatment of sick animals, and the sulfonamide products are recommended to be given as a drench or intravenously in the early stages of the disease.

Good care and rest are important in the prevention of the disease.

Sore mouth (contagious ecthyma) is a fairly common disease of sheep. Affected animals refuse to eat, and the lips as well as the muzzle may show diffuse sores and scabs. The simple form of the disease usually results in very little death loss, but in feeder lambs it causes other losses—lowered condition and poor gains.

To treat contagious ecthyma, or sore mouth, antiseptic ointments or tincture of iodine may be used after the scabs have been removed. Adding salt to the drinking water is also helpful.

Sore mouth can be prevented by vaccination, but this measure should be applied only if the farm premises are contaminated or if there is danger of an outbreak.

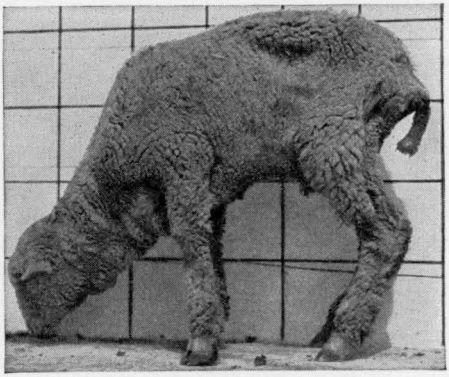
Worms in sheep, especially the common stomach worms, nodular worms, and lungworms, cause serious losses to the livestock owner. Flocks kept on permanent and poorly drained pastures are almost certain to become infested with parasites.

Treatment of wormy sheep may be the only way to prevent death losses. Treatment should be given: (1) before placing sheep on fresh

pasture in the spring; (2) at regular intervals during the pasture season (once a month with copper sulfate or phenothiazine); and (3) in early winter after the flock is taken off pasture.

No treatment will remove lungworms. The best protection against them, and against all other internal parasites, is to use only well-drained, rotated pastures. The following kinds of treatment can be used for worms other than lungworms.

Copper-sulfate treatment. One-percent copper sulfate (bluestone) is prepared by mixing 1⅓ ounces of copper sulfate and 1 ounce of 40-percent nicotine sulfate (Blackleaf 40) in 1 gallon of soft water.



Lamb heavily infested with internal parasites

Before giving the drench withhold feed for at least 32 hours. Use in the following doses: for yearlings and full-grown sheep, 4 ounces; for 75-pound lambs, 3 ounces; for 50-pound lambs, 2 ounces; and for 25-pound lambs, 1 ounce.

Phenothiazine treatment. Phenothiazine has proved an effective treatment both for nodular worms and for stomach worms. The dose for a ewe is about 1 ounce and for a lamb ½ ounce. Avoid treating ewes in the late stages of pregnancy. The breeding flock should be treated for nodular worms in early winter after it is taken off pasture and in spring before going on pasture. Nodular-worm larvae infesting the pasture are generally killed by freezing during the winter. If treatment of the ewes has removed most of the nodular worms, the pasture will not be rapidly reinfested in spring and the lambs will remain relatively free from them. Only lambs kept over for breeding stock need be treated the following winter and spring, but occasionally it may be advisable to treat all lambs. Different methods of administering phenothiazine, which does not mix with water alone, have been successfully employed.

Individual drenching with a syringe is the surest way to know that each ewe and lamb receives the prescribed dosage. For 16 sheep thoroly mix 1 pound of phenothiazine with 6 or 7 ounces of blackstrap molasses, then add enough water to make 1 quart. Two ounces of the mixture may be given to each adult sheep and 1 ounce to lambs. The mixture should be thoroly shaken before using, as it tends to separate on standing.

Whole milk can be used with phenothiazine instead of molasses and water. With a paper funnel place ½ pound of phenothiazine (enough for 8 sheep) in a gallon jug or bottle, add ½ gallon of milk, and shake until thoroly mixed. Then pour 8 ounces (one dose) into a measuring cup and from the cup thru a funnel into a 12-ounce pop bottle. Hold the sheep between the legs and tilt its head slightly upward, keeping one hand over the side of its mouth to prevent slobbering. Pour the dose into the sheep's mouth by inserting the neck of the bottle in the back part of the mouth between the animal's cheek and teeth.

A mixture consisting of 1 part phenothiazine to 14 parts of salt has also given good results. It is substituted for the usual salt supplement necessary for sheep and is fed continuously for a month or longer. The sheep may then be given salt alone in the usual way for a period of several days before being placed on the salt-phenothiazine mixture again.

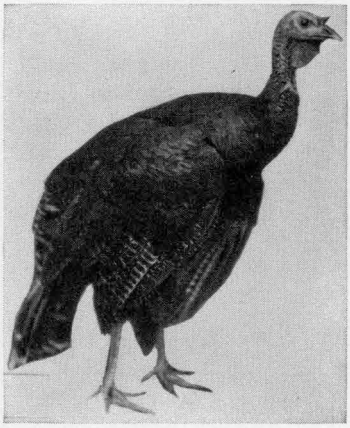
Phenothiazine can be purchased in the form of boluses, capsules, or a liquid.

Liquid Weights and Measures

Apothecaries'	60 minims	= 1 fluid dram
	8 fluid drams	= 1 fluid ounce
	16 fluid ounces	= 1 pint
	8 pints	= 1 gallon
Approximate or popular	1 drop	= 1 minim
	1 teaspoonful	= 1 fluid dram
	2 tablespoonfuls	= 1 fluid ounce
	1 standard measuring cupful	= 8 fluid ounces

POULTRY . . .

Steps in disease control. There are six essential steps in controlling an attack of an infectious disease in a farm flock: (1) Promptly dispose of dead and dying birds, preferably by burning. (2) Separate healthy birds from sick ones daily and isolate both groups from birds that have not been exposed. (3) Clean all houses, feeding equipment, drinking utensils, etc., by scrubbing with a hot lye solution (1 pound of commercial lye in 20 or 30 gallons of water). For more effective disinfection, use a 3-percent saponified cresol solution for final washing after the lye solution dries. This should be done before placing birds that have not been exposed to the disease in contaminated quarters. (4) Do not place additions to the flock or birds that have not been exposed to the disease on ground contaminated by sick birds until after the ground has been plowed or has been idle for at least six months. (5) Since some of the recovered birds may be carriers of the disease, be cautious about letting them associate with birds that have not been exposed. (6) Guard against the spread of disease by mechanical carriers, such as flies, feed and shipping crates, and clothing—particularly visitors' shoes.



Turkey with blackhead

Blackhead (infectious enterohepatitis, or histomoniasis) is a serious disease of young turkeys. It is spread by allowing birds to feed on material contaminated with the droppings of infected turkeys, chickens, or sparrows.

To prevent the disease, poults should be incubator-hatched and transferred at once to brooder houses with concrete floors that have been thoroly cleaned. Outside runs should be made of hardware cloth to keep the young poults from contact with the droppings. After the poults have been transferred to outside roosts, the roosts and pasture should be changed frequently. Turkeys should not be allowed to mingle with chickens, as chickens act as carriers of the disease.

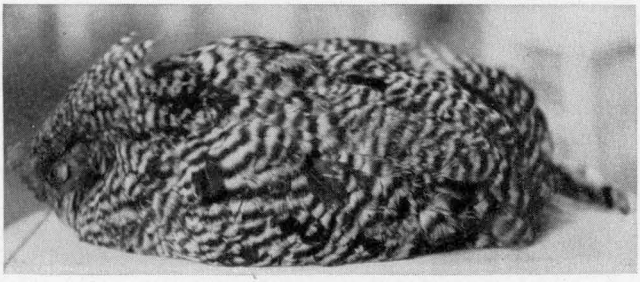
Bronchitis, infectious resembles infectious laryngotracheitis in many ways. It seldom causes heavy losses, however, except when it affects chicks during the first three weeks after hatching, when losses may run as high as 80 percent of the brood.

Bronchitis is often introduced thru the purchase of infected baby

or started chicks. It may also be carried on eggs, feathers, or debris from the poultry houses, or by trucks, people, or wild birds. To rid a hatchery or brooder house of infection, *dispose of all birds.* Then scrub all equipment, walls, and floors thoroly with hot lye solution. Follow this with a strong formaldehyde fumigation. Vaccination is not practicable. *For further information see References 22 and 27, page 47.*

Bronchitis in baby chicks

Cholera in fowls causes severe losses in Illinois. Altho this disease is caused by a bacterium, overcrowded and poorly ventilated houses, cold rains, sudden changes in weather or in the ration, together with

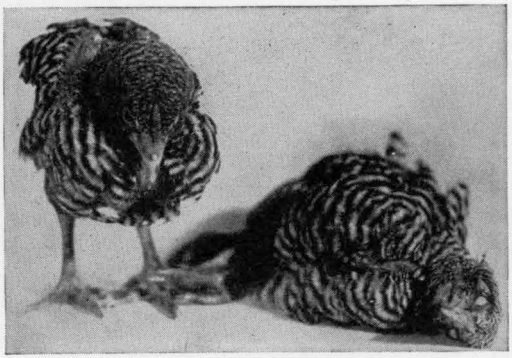


Fowl cholera

overfeeding and unsanitary surroundings, play an important part in its development.

To check fowl cholera, remove and destroy all sick birds and correct any faulty hygienic conditions. Keep the premises, water, and food containers thoroly clean. For best results, remove healthy birds from premises where the disease has occurred, plow contaminated yards, and do not use them for poultry ranges for three to six months. Keep all newly purchased stock, as well as fowls exhibited at shows, separate from the main flock for three weeks after reaching the premises. *For further information see Reference 19, page 47.*

Coccidiosis is a serious intestinal disease characterized by bloody droppings. Strict sanitation is essential for its control. Since the droppings of infected birds contain the organism which contaminates the feed, drinking water, ranges, etc., only fountains and feeders of sani-



Chicks with coccidiosis

tary design should be used. When an outbreak occurs, isolate all sick chickens. Keep the premises clear of droppings and contaminated litter. Incorporating 2 percent of flowers of sulfur in the ration will protect birds not already exposed to the disease, but it will not cure those already infected. Because rickets may develop, sulfur should not be fed to birds of any age unless they have access to direct sunlight.

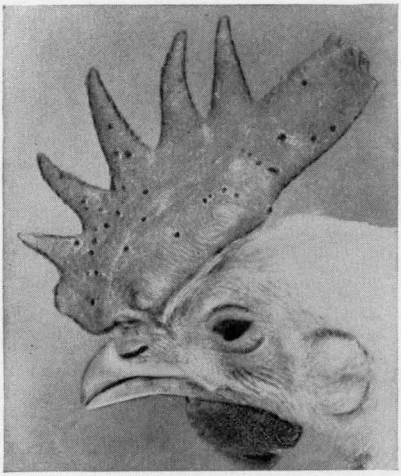
Newly hatched chicks are always free from coccidiosis. They can be kept relatively free from the disease if they are reared apart from older birds and in clean brooder houses and on clean range. Before the chicks are put in, the brooder houses should be thoroly cleaned with a boiling lye solution. The heat of the solution kills the coccidia; cresol and other disinfectants are not effective. If coccidiosis appears in the flock, the brooder houses should be cleaned daily.

Laryngotracheitis, infectious causes heaviest losses among pullets during late fall and winter. Occasional outbreaks occur in younger stock in the warmer season. Affected chickens gasp for air and emit wheezing, rattling, and whistling sounds. Suffocation is the cause of death.

Control measures for laryngotracheitis include: (1) strict quarantine for three weeks of any birds brought onto the premises, whether new stock or birds which have been exhibited at fairs or shows; (2) keeping out people who have any contact with other flocks; and (3) refusal to allow feed sacks, chicken crates, or other similar objects on the premises after they have been on other poultry farms.

In case of a suspected

Laryngotracheitis in young chicken



Fowl pox

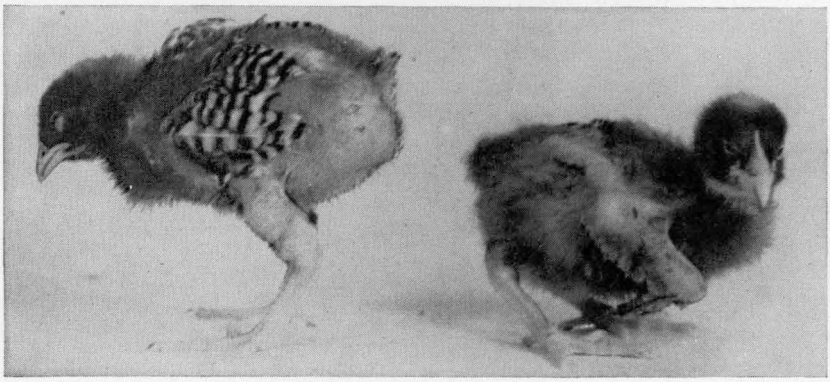
crease in weight, and lowered resistance to other diseases as well. There are two clinical forms of fowl pox: the cutaneous (skin) form, in which scab-covered nodules appear on the comb, wattles, and unfeathered portions of the body; and the diphtheritic (mouth) form, in which tough deposits appear in the mouth and upper air passages.

Fowl pox can be prevented by vaccination with either fowl-pox virus or pigeon-pox virus. Pigeon-pox virus is used to vaccinate laying birds or to help control an outbreak of the disease. Birds should be vaccinated only if there is immediate threat of the disease or they are on premises where the disease has occurred. During the war emergency, fowl-pox and pigeon-pox vaccines are furnished to veterinarians without charge by the Department of Animal Pathology and Hygiene, University of Illinois, Urbana.

For further information see Reference 20, page 47.

Pullorum disease (bacillary white diarrhea) causes heavy losses to the poultry industry by reducing the number of chicks that hatch and live and by lowering egg production.

The germs of this disease are easily destroyed by disinfectants, but they can remain alive and virulent in litter or damp soil. The disease localizes in the ovary of adult hens and is transmitted thru the egg,



Pullorum disease in chicks

accounting for losses from low hatchability of eggs and high chick mortality. It is also transmitted from diseased to healthy chicks in the incubator at the time of hatching, and in the brooder thru contaminated droppings. A reliable method of finding diseased adult birds in the flock is the blood agglutination test.

To combat pullorum disease, adhere to the following practices: (1) avoid hatching eggs from infected flocks; (2) disinfect incubators, brooders, and equipment; (3) do not hatch eggs from infected and noninfected hens in the same incubator; (4) do not feed infertile uncooked eggs; (5) test all breeding stock each year. *For further information see References 26 and 34, page 47.*

Roup (colds, or infectious fowl coryza) is an acute contagious disease of the upper air passages. The condition is very common in poultry flocks, particularly during winter. Once introduced, it spreads

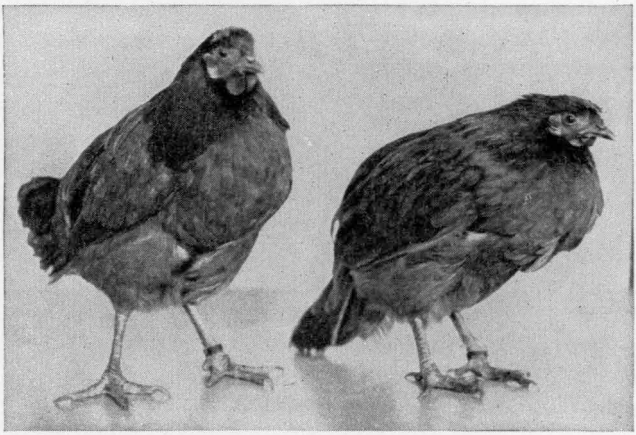
Hen with roup

rapidly. Crowding, poor ventilation, drafts, and improper nutrition make a flock more susceptible. The disease frequently occurs after or at the same time as an outbreak of fowl pox.

Roup is caused by a variety of bacteria, and should not be confused with nutritional roup, which results from a deficiency of vitamin A, for at times nutritional roup displays symptoms very similar to those of infectious roup. Birds suffering from infectious roup have watery eyes, sneeze frequently, and in a few days may show swelling in the area below the eyes. In cases of long standing, the swelling below the eyes may involve a large area.

To prevent infectious roup, avoid overcrowding, dampness, drafts, insufficient ventilation, worm infestation, and unsanitary conditions. Affected birds should be killed and burned. Recovered birds may become carriers, constituting a threat to the future health of the flock. No vaccine is effective. Irrigation of the nasal passages with 5-percent argyrol is often helpful. *For further information see Reference 27, page 47.*

Tuberculosis in poultry results in poor condition, lowered egg production, and eventual death. The infection may also spread to swine, causing additional losses to the owner by reason of price deductions made when lesions of this disease are found in swine at the time of slaughter.



Hens with tuberculosis

Treatment for tuberculosis in poultry is not effective. Losses from this disease can be prevented or held to a minimum by (1) using approved methods of poultry sanitation; (2) culling out birds which show any evidence of infection and, in badly infected flocks, by destroying all birds over one year of age; (3) keeping chickens out of hog lots; (4) getting rid of pigeons and sparrows which may harbor infection; and (5) using the tuberculin test.

Typhoid in fowls resembles fowl cholera. Laboratory examination is essential for correct diagnosis.

Control measures consist of rigid sanitation, which includes removal and destruction of all infected birds and daily cleaning and removal of litter. As the organisms are present in the droppings, it is essential that feed and water be protected from contamination. Eggs from an infected flock should not be used for hatching purposes, as the disease may be transmitted thru the egg.

Fowl typhoid causes a positive reaction to the pullorum test. *For further information see Reference 21, page 47.*

EXTERNAL PARASITES OF POULTRY[1]

More than thirty species of external parasites in all are known to infest fowls. Some live continuously upon fowls; others spend only a

[1]Prepared in cooperation with Illinois State Natural History Survey.

part of their existence on this host. Some obtain their nourishment by sucking blood; others by eating skin or feathers; still others bore under the skin. Not only do these parasites rob fowls of blood and other body tissues, but they also impair their general health and body functions. Infested young fowls grow less rapidly, and hens lay fewer eggs. Death may ultimately result. These parasites most commonly found in Illinois are described here.

Bedbugs are often found feeding on poultry. They hide in the cracks and crevices in the poultry house during the day and attack the birds at night. To kill bedbugs, soak all cracks in perches, dropping boards, etc., with oils as for common mites.

Fleas of several species may be found in poultry houses. To get rid of them remove all litter and dust and either burn it or scatter it in the fields. Soak floor and walls with oil, such as kerosene, waste crankcase oil, or a 5-percent dormant-tree spray emulsion, or scatter 1 pound of crude naphthalene over each 100 square feet of floor space.

Lice on chickens cause continuous irritation and lowered vitality. Seven species, including body, head, and feather lice, are commonly found on chickens. To prevent lice infestation, be careful not to add infested chickens to the flock. Paint roosts in poultry house with 40-percent nicotine sulfate. In warm weather dip infested flocks in a solution of 1 ounce of sodium fluoride or 1 ounce of sodium fluosilicate in a gallon of water. In winter treat with sodium fluosilicate or fresh pyrethrum or derris powder, dusting a pinch into the feathers over the vent, under the wings, and on the neck. Do not use artificial medicated eggs. They contain naphthalene and may injure both chickens and eggs.

Common chicken mites lower egg production and resistance to disease. They live in the chicken house, hiding under roosts and in cracks in the daytime and coming out at night. To get rid of them, fill cracks where they hide. Clean out dirty litter and repair loose boards. Spray houses and paint roosts with either 1 part kerosene to 4 parts waste crankcase oil, or crude petroleum, or dormant-tree spray oils in a 5-percent dilution. Also apply creosote to the perches. Give further protection from mites by putting a layer of sulfur beneath the straw in the nests.

Depluming mites burrow into the skin near the base of the feathers and cause severe itching, which makes the fowl pull at its feathers. To check depluming mites, be careful not to add affected chickens to the flock. Paint roosts in poultry house in same way as for common mites. Dip all chickens in a solution made by mixing ¾ ounce of sodium fluoride, 2 ounces of sulfur, and 1 ounce of soap in a gallon of water. Another treatment consists of providing dry dust baths of road dust and sulfur.

Red mites (chiggers) attach themselves to the skin in groups be-

neath the wings and on the breast and neck of fowls, especially young chicks. They cause intense irritation, which may result in abscesses. Unless these red mites are controlled, death losses among young chicks may be high. To prevent infestation with red mites, keep the flock away from ranges where they are likely to occur. Apply either kerosene and lard or sulfur ointment to infested birds. Another treatment consists of dusting chickens lightly with 300-mesh dusting sulfur.

Scaly leg mites commonly remain on the feet, burrowing beneath the scales and causing "scaly leg." If left untreated, the birds' feet often become badly distorted. Mites spread readily from one bird to another. To control these pests be careful not to add infested chickens to the flock and isolate all birds already infested. Treat the flock by dipping the birds' legs in used crankcase oil, kerosene, or crude petroleum. Do not get the dip on the feathers. Paint roosts as for common mites.

Subcutaneous tissue mites are small, soft-bodied mites which bore into the skin. Damage is not great unless large numbers are present. Remains of mites are frequently seen under the transparent skin of the breast as yellowish granules shaped like millet seeds. To prevent these mites observe all principles of hygiene and sanitation in housing and management. Feed well-balanced rations.

INTERNAL PARASITES OF POULTRY

An ounce of prevention is worth more than a pound of cure in the control of internal parasites of poultry. It is relatively easy to keep young fowls from becoming heavily infested, but poultry once infested can rarely if ever be cured.

If a flock is wormy, faulty sanitation may be the cause. Move the flock to a well-drained fresh range every few weeks or months. Standing water or mud holes favor worm parasites, as does also the moisture that collects around unsanitary drinking containers. Slugs, which thrive in moist environment, carry these parasites and, when eaten, they transmit them to poultry. For this reason litter should be removed frequently and spread on ground not used by poultry.

Newly hatched chicks are always free from internal parasites. To keep them free, rear the young birds apart from older birds in sanitary surroundings. Transfer the flock to a clean range each year.

For mass treatment of the flock for roundworms, include in the mash for three or four weeks 2 percent of tobacco dust containing at least 1.5 percent nicotine. Following each treatment dissolve in the drinking water 1 pound of epsom salts for every 100 birds. *For further information see References 23 and 24, page 47.*

HORSES . . .

Azoturia, sometimes referred to as "Monday morning disease," usually develops suddenly after a period of idleness or rest. Vigorous, well-nourished horses are most likely to be affected. The symptoms include heavy sweating, dark-colored urine, incoordination of hind legs, and abnormal firmness of muscles over the region of the shoulder, loin, and rump.

To prevent azoturia reduce grain feed at least one half on idle days and turn the horses on grass if possible. If symptoms appear, absolute rest is necessary. No attempt should be made even to move an affected animal from the field to the barn. Blanket the animal wherever it is and call a veterinarian. Irritating purgatives should not be used, but mineral oil may be helpful in some cases. Apply hot water or hot salt packs to the affected muscles. Careful inspection of horses as they leave the stable may enable an owner to detect mild cases and avoid the serious consequences that often follow if horses are worked in the early stages of the disease.

Bots of three species infest Illinois horses: the chin or throat fly, the common botfly, and the nose fly. The nose fly is uncommon, but the throat fly and common botfly are widely distributed in the state.

Animals may be allowed water but no hay, grain, bedding, straw, or food of any kind for twenty-four hours before treatment. Water, as well as feed, should be withheld for five hours after treatment. Liquid carbon disulfide, which is inflammable and must be handled cautiously, has proved the best treatment. (The powdered form is sometimes recommended, but results obtained from it seem somewhat less effective than from the liquid.) The proper dose of carbon disulfide is 6 fluid drams (24 cc.), given in capsules, for each 1,000 pounds of live weight. Caution is necessary in administering this material. If a capsule breaks in the laryngeal region, mechanical pneumonia may result.

Colic is defined as pain in the abdomen. It may involve the stomach, the small or large intestine, or all three, and may be traceable to parasites as well as to irregular feeding and watering, overfeeding, sudden changes in the ration, and unwholesome or damaged feed. Horses that are inclined to suffer from colic should be examined for parasites and, if infested, given proper treatment. Unthriftiness, uneasiness, striking at the abdomen, getting up and down recklessly, and bloating are suggestive of colic.

Until the veterinarian arrives it may be helpful to stimulate bowel movement by giving the affected animal a quart of raw linseed oil or soybean oil containing an ounce of turpentine or an ounce of kerosene. To reduce pain, chloral hydrate or other sedatives are prescribed in limited amounts for severe cases.

Founder (laminitis) is a serious ailment affecting the feet of horses. It most commonly follows gorging on grains, but occasionally occurs in mares after foaling and in heavy horses working on hard footing. The disease is characterized by fever and by severe pain in the feet. All four feet are usually more or less affected, but the evidence of pain may be more extreme in the front feet.

To prevent founder, avoid overfeeding, get prompt veterinary attention for foaling disorders such as inflammations of the uterus or womb, shoe the horses properly, and adjust the amount of work they do on hard surfaces.

When founder appears, the veterinarian should be called at once. Until he arrives the horses' feet should be kept in cold running water or in ice if it is available. The lameness which results from founder may be reduced by using wide web and bar shoes to remove the weight from the toe and sole of the foot.

Heat stroke in horses is usually due to exposure to the direct rays of the sun, too close confinement in hot, humid stables, shipping long distances in overcrowded cars in hot weather, or to working long periods in excessively hot weather. The inside horses of a four-horse team are particularly subject to heat stroke. Symptoms commonly noted are dullness, rapid breathing, stumbling gate, and a dry skin. Collapse and even convulsions may follow. The heartbeat is fast and irregular, and the body temperature may be 105° to 110° F.

To help prevent heat stroke, work horses should be salted daily, watered often, and in sultry weather given rest periods during working hours. Shade and cold water are an essential first-aid measure. The cold water may be sprinkled from a hose, or cold packs may be applied to the head and back.

Influenza (shipping fever, or pinkeye) is one of the most contagious and prevalent diseases of horses and mules. Death losses are usually relatively low but affected animals are not able to work. Symptoms include loss of appetite, fever, weakness, rapid breathing, coughing, eye and nose discharges, and so-called "pinkeye." Swellings may appear on the legs, belly, and head. Complications such as pneumonia, diarrhea, strangles, and even nervous disorders greatly decrease the likelihood of recovery.

To prevent influenza, use good feeding and management practices and maintain a rigid quarantine of newly purchased horses and mules for 21 days. The quarantined animals should be housed in a separate stable and have a separate attendant. Animals that develop the disease should be given complete rest in a stall that is well-bedded and ventilated but draft-free and they should be given small amounts of nutritious feed.

Efforts are being made to develop a specific vaccine for influenza

in horses. To date inoculations are used only on the theory that they may help protect the animal against complicating infections. Medicinal treatment should be limited to that prescribed by the veterinarian.

Lice. See page 13.

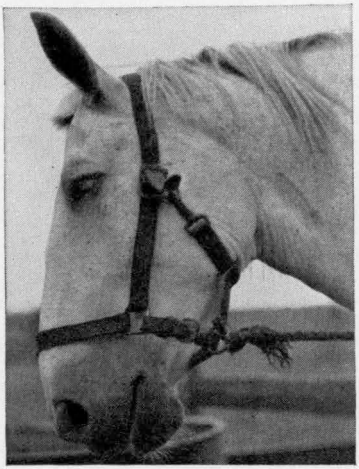
Scratches is an inflammation of the skin in the region of the heels. Mud and filth irritate the skin and may cause the disease; fungus infections are also associated with it. Affected parts itch and horses often stamp or kick the floor. An ill-smelling sticky discharge from the skin accumulates on the hair. The skin may crack, causing open sores, and affected animals may become lame. Proud flesh, resembling small tumors, may develop and bleed easily.

Providing horses with clean, dry stalls will help to prevent "scratches." When a horse is affected, clip the hair and clean the involved area. Apply air-slaked lime, white lotion, boric acid, or radiator alcohol. In long-standing cases the proud flesh should be cauterized with a stick of sodium hydroxide, antimony, or a 10 percent copper-sulfate solution.

Sleeping sickness (encephalomyelitis) is caused by a virus which invades the brain and spinal column. In recent years two types of this disease, the Eastern and the Western, have been recognized. Both types occur in the summer and promptly subside after the first hard frost. Symptoms include sleepiness, paralysis of facial muscles, blindness, difficulty in walking, weakness, inability to swallow, and foul breath.

Two doses of chick-embryo vaccine given intracutaneously (between the layers of the skin) will protect horses against sleeping sickness for about a year. Serum is effective if given in the very early stages of the disease.

Sore shoulders, necks, and backs result from equipment that does not fit properly. Collars that are too large ride too far back on the shoulders and cause irritation which results in "shoulder galls." If collars are too narrow, they bruise the shoulders and injure the deeper tissues. A tight collar interferes with breathing and blood circulation and may cause sore necks and shoulders. Collars that are dirty or have irregular surfaces, or locks of mane under the collar often irritate the skin. Saddle horses may de-



Sleeping sickness

velop pressure points and "saddle galls" from improperly fitted saddles, dirty saddle blankets, or wrinkles in the blankets.

In the treatment of sore shoulders, necks, and backs, the main thing to do is to remove the cause. Collars should fit correctly and saddles, saddle blankets, and harnesses need to be well cared for. All parts of the body that have been irritated need to be promptly treated with astringent gall lotions and ointments. In the early stages of soreness, resting the horses and applying cold packs to the affected parts are beneficial in preventing excessive tissue damage, but hot packs may aid in speeding up healing. Antiseptics and astringent dusting powders are useful in treating mild shoulder, neck, and back wounds. In severe cases, where large soft swellings or hard bumps develop, surgical relief may be necessary.

To prevent sore shoulder, necks, and backs, it is recommended that the animals be inspected daily and that their collar and saddle beds be washed with salt water. Feeding balanced rations and keeping horses free from intestinal parasites will also help to reduce harness sores.

Strangles, sometimes incorrectly called distemper, is a specific germ disease of horses. The symptoms include fever, loss of condition and weight, and weakness. The lymph glands of the throat may contain pus and be swollen and sensitive. Abscesses may develop at any point in the body.

To prevent strangles, quarantine all newly purchased animals for at least three weeks. To control the disease, clean and disinfect stables. Affected horses should be isolated and well cared for. Administering stimulants and draining the abscesses are recommended. Feeding the animals from the floor may help to drain the pus from the nostrils.

OTHER PUBLICATIONS

Illinois Circulars and Leaflets. The following publications are currently available and will be sent free of charge upon request addressed to COLLEGE OF AGRICULTURE, Urbana, Illinois. (*Be sure to give both key and title when ordering.*)

Reference	*Key*	*Title*
General		
1	C-411	Feeding of mineral supplements to livestock
Cattle		
2	C-544	Brucellosis of cattle
3	Folder	Brucellosis in cattle
4	APH101	Brucellosis or Bang's disease control (*mimeo.*)
5	APH103	Calf scours and pneumonia (*mimeo.*)
6	APH22	Herd program for mastitis control (*mimeo.*)
7	Folder	Mastitis
8	APH81	Plant poisoning in animals (*mimeo.*)

Reference	Key	Title
Swine		
9	C-435	Brucellosis in swine
10	Folder	Brucellosis in swine
11	C-269	Common parasites of swine
12	Folder	Enteritis (necro)
13	C-395	Feeding hogs on Illinois farms
14	Folder	Hog cholera
15	Folder	Mange in swine
16	C-471	Swine erysipelas
17	Folder	Swine erysipelas
18	C-306	McLean county system of swine sanitation
Poultry		
19	C-441	Fowl cholera
20	C-430	Fowl pox
21	C-287	Fowl typhoid
22	C-403	Incubator hygiene
23	C-469	Internal parasites of poultry
24	Folder	Internal parasites of poultry
25	C-467	Leucemia of fowls
26	C-432	Pullorum disease of chicks
27	C-517	Respiratory disease of poultry
Horses		
28	C-397	Common parasites of horses

U. S. Publications. These can be obtained from your farm adviser or direct from the SUPERINTENDENT OF DOCUMENTS, Washington, D.C. When obtained from the latter, the prices are as indicated.

Reference	Key	Subject
29	F.B. 909	Cattle lice and how to eradicate them (*5 cents*)
30	F.B. 1652	Diseases and parasites of poultry (*15 cents*)
31	1942 Yearbook	Keeping livestock healthy*
32	Cir. 148	Parasites and parasitic diseases of horses (*10 cents*)
33	F.B. 1330	Parasites and parasitic diseases of sheep (*5 cents*)
34	Misc. Pub. 300	U. S. poultry improvement plan (*5 cents*)

Animal Pathology Exchange. The following issues, containing technical discussions of animal diseases, will be sent free as long as the supply lasts. Address DEPARTMENT OF ANIMAL PATHOLOGY AND HYGIENE, COLLEGE OF AGRICULTURE, Urbana, Illinois.

Acetonemia in cattle — Jan.-Mar. 1938
Blackhead in poultry — July-Sept. 1938
Disinfection of premises — July-Sept. 1936
Prussic-acid poisoning in cattle — Jan.-Mar. 1941
Stomach worms in sheep — Apr.-June 1937
Vitamin deficiency diseases — Apr.-June 1942

Good Management

The following Illinois Circulars furnish information on good feeding and management practices:

C-502, Feeding the Dairy Herd
C-395, Feeding Hogs on Illinois Farms
C-374, Keeping the Farm Flock Healthy
C-534, The Sheep Enterprise
C-424, The Farm Horse

*Write your Congressman or Senator for the 1942 Yearbook of the U. S. Department of Agriculture, "Keeping Livestock Healthy."

DISINFECTING PREMISES

SICK ANIMALS AND THEIR DISCHARGES that accumulate on bedding and floors are the chief means of spreading infection in herds and flocks. To destroy the disease germs, all bedding, manure, and other waste materials should be burned or spread thinly on ground not used by animals. Buildings should be thoroly cleaned, then disinfected with sunlight or chemicals.

Chemical Disinfectants

Lye—1-pound can to 20 to 30 gallons of boiling water

Liquor cresol compound (U.S.P.) — 2 to 3% solution

Carbolic acid — 3 to 5% solution

Bichloride of mercury — 1 part to 1,000 parts of water by weight

Boric acid (odorless) — 4% solution

Solutions

	In 1 quart of water	*In 1 gallon of water*
2% solution =	5 teaspoons	2½ ounces
3% solution =	2 tablespoons	3¾ ounces
4% solution =	2½ tablespoons	5 ounces
5% solution =	3 tablespoons	6¼ ounces

The above chemical disinfectants vary in their power to kill different germs. They are often most effective when used hot. Lye is cheap and when correctly used is effective against most disease organisms. Compound cresol solution (U.S.P.), or its equivalent, is also good.

Germs in the ground can be destroyed best by cultivation and cropping.

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